Flora of Tasmania online

MENEGAZZIA [1]

Gintaras Kantvilas [2]

Menegazzia A.Massal., *Neagenea Lich.*: 3 (1854)

Type: *M. terebrata* (Hoffm.) A.Massal.

Thallus foliose and lobate, typically perforate, frequently sorediate, rarely isidiate; soralia laminal or associated with the perforations, diffuse, convex or vesicular; lobes hollow, highly inflated and cylindrical, or somewhat flattened, especially towards the apices, robust and leathery or brittle and fragile, loosely to tightly imbricate in the thallus centre and radiating palmately towards the margins, or scattered ± randomly over the substratum; upper surface a shade of grey, yellow, green or chestnut-brown, sometimes streaked or blotched with black, occasionally pruinose or maculate at the lobe apices; perforations numerous or few, rarely absent, scattered or contiguous, sometimes forming a lace-like reticulum, with the margins level with the upper surface, turned inwards or markedly elevated to form a short cylinder or volcano-shape; medullary cavity byssoid and whitish in most species when young, often becoming discoloured grey or black, occasionally pigmented orange or yellow; lower surface glossy black, erhizinate, attached to the substratum either directly or via bulges of the lower cortex. Photobiont a unicellular green alga with globose cells 10–18 µm diam. Ascomata apothecia, lecanorine; disc typically glossy yellow-brown to brown, concave at first, later plane or becoming undulate; proper exciple in section cupulate. Hymenium hyaline, overlain by a brown or reddish brown epithecium that is sometimes inspersed with minute crystals that fluoresce in polarised light and dissolve fleetingly yellowish in KOH. Paraphyses to 2 µm thick, highly branched and anastomosed and forming a dense reticulum, sometimes with apices capitate and/or pigmented, 2–4(–6) µm wide. Asci 2-spored or 8-spored with up to 4 spores sometimes aborted, broadly ellipsoid to clavate, with a prominent, amyloid tholus, a rather fuzzy, barrel-shaped *masse axiale* and a conical ocular chamber. Ascospores simple, broadly ellipsoid to subglobose, non-halonate, hyaline but sometimes becoming brownish with age, with a thick, 2-layered wall. Coniodiomata pycnidia, immersed in the upper surface, visible as black specks that comprise the ostiole and a narrow rim of discoloured cortical tissue. Conidia filiform to narrowly fusiform. Chemistry: atranorin or usnic acid (rarely) occur in the cortex; medullary chemistry is complex and usually consists of depsides, depsidones or fatty acids, as well as a range of pigments.

With 31 species, *Menegazzia* is one of the most conspicuous and species-rich genera of macrolichens in Tasmania, especially in wetter areas where, together with genera such as *Bunodophoron* and *Pseudocyphellaria*, it forms a major component of the epiphytic flora in rainforest and heathland. Several species also occur on rocks, especially at higher elevations. The genus is widely distributed throughout the world, ranging from temperate latitudes in both hemispheres to montane areas in the tropics. However, its stronghold is in the southern parts of the Southern Hemisphere and, in particular, in Tasmania and New Zealand. Some of this apparent diversity is probably a result of the genus being the focus of more extensive study in these areas. Species of *Menegazzia* are distinguished from each other by secondary chemistry, numbers of ascospores per ascus, presence of soredia, morphology of the soralia and morphology of the diagnostic perforations. Chemical composition is critical to the extent that routine TLC is almost mandatory for confirming the identity of many species in the absence of extensive field experience. All grey, greenish or chestnut-brown species contain atranorin, although often only in trace amounts. The most common

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medullary chemosyndrome in Tasmanian *Menegazzia* is stictic acid, associated with some or all of a suite of biosynthetically-related compounds.

The major chemosyndromes found in Tasmanian species are:

Ia. Stictic acid syndrome (*M. aeneofusca, M. caesiopruinosa, M. corrugata, M. eperforata, M. hypogymnioides, M. kantvilasii, M. neozelandica, M. nothofagi, M. platytrema, M. subpertusa, M. subtestacea*).

Ib. Stictic acid syndrome, plus unknown orange pigments (*M. athrotaxidis*).

Ic. Stictic acid syndrome, plus echinocarpic acid and emodin pigments (*M. caliginosa*).

Id. Stictic acid syndrome, plus isopigmentosin and lacking menegazziaic acid (*M. elongata, M. endocrocea, M. subbullata*).

Ie. Stictic acid syndrome, plus lecanoric acid (*M. myriotrema, M. ramulicola*).

IIa. Norstictic and connorstictic acids (*M. norstictica, M. sanguinascens*).

IIb. Norstictic and connorstictic acids plus lecanoric acid (*M. tarkinea*).

III. Caperatic acid (*M. abscondita, M. confusa*).

IVa. Protolichesterinic and lichesterinic acids, plus skyrin (*M. jamesii*).

IVb. Protolichesterinic and lichesterinic acids, plus secalonic acid (*M. pertransita*).

IVc. Protolichesterinic and lichesterinic acids (*M. minuta*).

V. Lecanoric acid (*M. globulifera*).

VI. Fumarprotocetraric acid (*M. hypernota, M. petraea*).

VII. Unknown fatty acids (*M. inactiva*).

VIII. Alectoronic acid (*M. ultralucens*).

Key references: James & Galloway (1992); Kantvilas & Louwhoff (2004); Kantvilas (2012, 2019).

Key to the Species

1	Thallus sorediate or isidiate, with or without apothecia	2
	Thallus neither sorediate nor isidiate, usually with apothecia	17
2(1)	Thallus isidiate	3
	Thallus sorediate	5
3(2)	Thallus perforate; isidia in coralloid clusters that rupture or abrade and become sorediate	21 M. nothofagi
	Perforations absent; isidia knob-like or resembling elongate lobules	4
4(3)	Upper surface olive-brown; medulla K–, P– (protolichesterinic acid); isidia knob-like and resembling minute lobules; very rare and inconspicuous, forming tiny thalli <1.5 cm wide on twigs	17 M. minuta
	Upper surface pale olive-green to greyish green, brownish to black-brown at the margins and apices; medulla K+ yellow, P+ orange (stictic acid); isidia soon becoming elongate and cylindrical; thallus typically forming rosettes to 8 cm wide on trunks	10 M. eperforata
5(2)	Upper surface yellow (usnic acid); soralia mostly in laminal, helmet-shaped vesicles; medulla C+ red (lecanoric acid); ± restricted to higher elevations	11 M. globulifera
	Upper surface a shade of grey or grey-green (atranorin); soralia in vesicles, pustules, at the margins of perforations or occurring directly on the upper surface; medullary reactions various but never C+ red	6

6(5)	Lobes mostly ≤1 mm wide; upper surface brownish green to grey-green, conspicuously white-maculate, especially towards the lobe apices; soralia typically congested in the thallus centre, derived from inflated, subglobose to elongate vesicles that become abraded; widespread and common on rocks and trees	**21 M. nothofagi**
	Lobes mostly >1.5 mm wide; upper surface a shade of pale grey, not conspicuously maculate; soralia scattered and various (laminal, vesicular or pustular)	7
7(6)	Medulla and soralia P–	8
	Medulla and soralia P+ orange or red	10
8(7)	Medulla KC+ red, UV+ white (alectoronic acid); lobes relatively robust, not markedly inflated	**31 M. ultralucens**
	Medulla KC–, UV– (fatty acids); lobes typically very fragile and inflated	9
9(8)	Containing caperatic acid; medulla in the throat of the perforations and elsewhere sometimes patchily pale orange	**1 M. abscondita**
	Containing four unidentified fatty acids; medulla near the perforations white	**14 M. inactiva**
10(7)	Medulla K–, P+ red (fumarprotocetraric acid)	**12 M. hypernota**
	Medulla K+ yellow or yellow→red	11
11(10)	Internal wall of medullary cavity orange-yellow, K+ purple, UV+ orange (emodin pigments); medulla containing echinocarpic acid	**5 M. caliginosa**
	Internal wall of medullary cavity white to blackened, never orange and K+ purple; echinocarpic acid absent	12
12(11)	Lobes inflated, noticeably constricted in sausage-like segments and at the axils, usually unorientated, dispersed or imbricate; medulla containing isopigmentosin, visible as a strongly UV+ yellow spot on developed TLC plates; common at high elevations	**27 M. subbullata**
	Lobes inflated or not, never sausage-like, typically forming radiating rosettes; medulla lacking isopigmentosin	13
13(12)	Soralia developing from globose, helmet-shaped vesicles; common in low rainfall areas, especially near the coast	**4 M. caesiopruinosa**
	Soralia various, but never in helmet-shaped vesicles	14
14(13)	Margins of perforations conspicuously turned upwards and developing crescent-shaped soralia	15
	Margins of perforations ± flush with the thallus surface, generally not sorediate; soralia mostly laminal, scattered and convex	16
15(14)	Soralia arising from abraded, scattered pustules that become sorediate and resemble perforations	**16 M. kantvilasii**
	Pustules absent and all soralia developed at the margins of elevated perforations	**19 M. neozelandica**
16(14)	Medulla K+ yellow (stictic acid complex); very common and widespread on bark, wood and rocks	**28 M. subpertusa**
	Medulla K+ yellow→red (norstictic acid); very rare	**26 M. sanguinascens**
17(1)	Asci 8-spored	18
	Asci 2-spored	19
18(17)	Medullary cavity at the lobe apices white with flecks of a bright yellow, K+ purple pigment (skyrin); very rare in Tasmania	**15 M. jamesii**
	Medullary cavity white or suffused yellowish, K– or K+ reddish brown (secalonic acid); very common and widespread, especially in rainforest	**22 M. pertransita**
19(17)	Upper surface predominantly brownish, olive-brown, blackish brown or mottled grey-brown	20
	Upper surface predominantly pale grey to greenish grey, with brownish tints restricted mainly to lobe apices	23
20(19)	Lobes mostly 1.5–3.5 mm wide, usually somewhat 'puffy' and inflated; apothecia with a swollen pedicel, conical to hemispherical; very common on the twigs of shrubs at high altitudes	**29 M. subtestacea**
	Lobes mostly <1.5 mm wide, not inflated; apothecia soon flat and discoid (sometimes absent); on rocks	21

21(20)	Medulla P+ red, K– (fumarprotocetraric acid); a rare species recorded from alpine conglomerate	**23 M. petraea**
	Medulla P+ orange, K+ yellow (stictic acid)	22
22(21)	Lobes lacking perforations, with apices flattened and concave; a rare species recorded from alpine quartzite and conglomerate	**13 M. hypogymnioides**
	Lobes perforate, with apices inflated to slightly flattened, not concave; widespread and common on various rock types	**2 M. aeneofusca**
23(19)	Perforations very numerous and forming a lace-like network; lobes mostly 0.5–1 mm wide, usually markedly flattened to concave at the apices	**18 M. myriotrema**
	Perforations sparse to abundant, scattered and not forming a lace-like network; lobes much broader, with apices inflated or only slightly flattened	24
24(23)	Medulla P– (caperatic acid)	**6 M. confusa**
	Medulla P+ orange (stictic or norstictic acids)	25
25(24)	Medulla K+ yellow→red (norstictic acid)	26
	Medulla K+ yellow (stictic acid)	27
26(25)	Medulla containing additional lecanoric acid; thallus compact, with very sparse perforations; very rare, on twigs	**30 M. tarkinea**
	Lecanoric acid absent; thallus forming neat, radiating rosettes, typically with numerous perforations; widespread on trunks and branches	**20 M. norstictica**
27(25)	Margin of apothecia 0.5–1.5 mm wide, grossly inflated, corrugated and often obscuring the disc; lobes typically very wide (to 6 mm), inflated and conspicuously wrinkled; found mostly in highland areas	**7 M. corrugata**
	Margin of apothecia 0.2–0.5 mm wide, not inflated, entire, crenulate or radially cracked, with the disc clearly exposed; lobes typically 1–4 mm wide, smooth or only slightly wrinkled	28
28(27)	Medulla containing isopigmentosin (visible as a strongly UV+ yellow spot on developed TLC plates); lobes inflated; hymenium not inspersed	29
	Medulla lacking isopigmentosin, although other orange, UV+ orange pigments may be present; lobes cylindrical, not inflated; hymenium inspersed with KOH-soluble granules	30
29(28)	Lobes forming sausage-like segments with markedly constricted axils, generally unorientated, dispersed or imbricate; an epiphyte in wet forest, especially at higher elevations	**8 M. elongata**
	Lobes not markedly constricted at the axils, generally in neat or irregular rosettes; restricted to granite rocks on coastal pinnacles	**9 M. endocrocea**
30(28)	Medulla containing up to three orange, UV+ orange pigments (sometimes in trace amounts); margins of perforations flush with the thallus surface or slightly upturned; restricted to highland areas, mostly on conifers	**3 M. athrotaxidis**
	No pigments present; margins of perforations flush or turned slightly inwards	31
31(30)	Medulla containing lecanoric acid in addition to stictic acid; thallus with very sparse perforations, typically very compact and enveloping twigs	**25 M. ramulicola**
	Lecanoric acid absent; thallus usually with abundant perforations, typically forming neat rosettes	**24 M platytrema**

1 Menegazzia abscondita Kantvilas

Lichenologist 44: 198 (2012). Type: Tasmania, Gordon River Road, 42°49'S 146°17'E, 340 m, on roadside young *Nematolepis squamea* at edge of regenerating wet eucalypt forest, 9 November 2010, *G. Kantvilas 272/10* & *J. Jarman* (holo—HO!).

Thallus loosely adnate, extremely brittle and fragile, forming irregular colonies to *c.* 6 cm wide comprising rather disorganised, scattered lobes, sorediate. Lobes 1–3 mm wide, markedly inflated and cylindrical, with widely diverging, irregularly branched main lobes and shorter laterals arising almost perpendicularly, loosely imbricate to separate ± throughout; apices discrete. Upper surface ± perforate, pale grey to pale greenish grey, here and there blotched or lined with black along the lobe margins, matt, epruinose, faintly maculate towards the lobe apices, smooth. Perforations very sparse, roundish, 0.1–1 mm wide, arising at the apices of

cylindrical or inflated, flat-topped vesicles 1–3 mm wide and markedly elevated (to 2.5 mm) above the thallus surface, usually with the margins turned inwards when young but soon becoming torn and sorediate. Medullary cavity mostly byssoid and white, becoming discoloured grey to brownish black in older lobes, typically patchily pale orange in the throat of the perforations. Soralia numerous, ragged and torn, developing on the inner surface of the elevated, flaring perforations, typically crescent-shaped and not extending around the entire circumference of the perforation; soredia whitish to pale greenish grey, farinose to coarsely granular. Apothecia and pycnidia not known.

Chemistry: atranorin, caperatic acid; medulla K–, KC–, C–, P–, UV–; the orange pigment gives no reaction in K or UV light, and is not detected on TLC plates.

Apparently very rare in Tasmania and also known from New Zealand. Most collections are from young saplings at the margins of rainforest, wet eucalypt forest and heathland at low to mid-elevations. It is likely to be a rare canopy species that is found at low heights only in forest gaps or at forest margins. It is most similar to *M. inactiva*, which differs chemically.

Near Confidence Saddle, 41°50′S 145°27′E, 440 m, 1974, *G.C. Bratt 74/117* (HO); Romney Marsh, 41°32′S 145°40′E, 1986, *G. Kantvilas 156/86* (HO); Savage River Pipeline Road, N of Donaldson River, 41°20′S 145°16′E, 460 m, 1990, *G. Kantvilas 262/90 p.p.* (HO).

2 Menegazzia aeneofusca (Müll.Arg.) R.Sant.

Ark. Bot. 30A(11): 13 (1942); —*Parmelia aeneofusca* Müll.Arg., *Flora* 66: 77 (1883).

Thallus typically tightly adnate, forming rosettes to *c.* 10 cm wide, sometimes with the centre missing and only the peripheral lobes present, lacking soredia or isidia. Lobes 0.5–1.5(–1.8) mm wide, cylindrical to somewhat flattened, densely branched and imbricate at the centre of the thallus and sometimes congested with tiny secondary lobules, at the margins palmately radiating, contiguous; apices inflated or slightly flattened. Upper surface perforate, typically chestnut-brown or blackish brown, but increasingly pale greyish or olive-grey when in shade, matt to glossy, epruinose, emaculate, smooth to slightly wrinkled, especially at the lobe tips. Perforations sparse to numerous, roundish, 0.1–0.5 mm wide, with the margins flush with the thallus surface or slightly turned inward. Medullary cavity on the upper side byssoid, white or discoloured grey to black in older lobes, on the lower side grey to black. Apothecia to 4 mm wide, sessile to subpedicellate, mostly flat and discoid when mature; thalline margin not inflated, smooth and entire, or with occasional radial cracks. Hymenium 100–120 µm thick; epithecium inspersed; asci 2-spored. Ascospores (26–)30–*37.8*–48 × 20–*25.5*–32(–36) µm. Conidia 6–8 × 0.5 µm.

Chemistry: atranorin, stictic acid, constictic acid, cryptostictic acid (trace), menegazziaic acid (trace), peristictic acid (trace), norstictic acid (trace), 3-*O*-methylconsalazinic acid (trace), plus additional traces of related compounds; medulla K+ yellow, KC–, C–, P+ orange, UV–.

Widespread and common on all rock types. Although mostly seen at higher elevations, especially in alpine heathland, it extends into the lowlands where it is restricted to fire-protected faces or crevices of large rock outcrops in open eucalypt forest. This species is easily recognised by its saxicolous habitat, brownish, relatively narrow, esorediate, sparsely perforate lobes and its chemical composition. It is also known from mainland Australia and New Zealand.

Mt Penny West, 42°02′S 146°56′E, 1134 m, 1969, *G.C. Bratt 69/179 & K.M. MacKay* (HO); Brown Mountain, 42°36′S 147°31′E, 790 m, 1991, *G. Kantvilas 272/91* (HO, M); Flinders Island, saddle at head of Leventhorpe Gully, 40°04′S 148°05′E, 330 m, 2007, *G. Kantvilas 64/07* (HO).

3 Menegazzia athrotaxidis Kantvilas

Lichenologist 44: 202 (2012). Type: Tasmania, Mt Field National Park, "The Pine Forest", *c.* 2 km SE of Lake Emmett, 42°38′S 146°33′E, 980 m, on *Athrotaxis cupressoides* in open montane rainforest, 29 March 1990, *G. Kantvilas 149/90* (holo—HO!).

Thallus loosely to tightly adnate, usually forming rather neat rosettes to *c*. 10 cm wide or enveloping foliage twigs, lacking soredia or isidia. Lobes 1–3.5(–4) mm wide, cylindrical to somewhat flattened, sparsely dichotomously branched, imbricate, congested and convoluted at the centre of the thallus, at the margins palmately radiating, contiguous; apices inflated or slightly flattened. Upper surface perforate, grey-white to cream-white, often blackened or suffused brownish along the lobe margins and at the apices, matt to glossy, epruinose, mostly emaculate but with faint, effigurate maculae near the apices, smooth when young but increasingly wrinkled, dimpled or somewhat ridged in older lobes. Perforations sparse to numerous, roundish, 0.5–1(–1.5) mm wide, with the margins with a slightly upturned collar or flush with the thallus surface. Medullary cavity byssoid and white in younger lobes, occasionally faintly pale orange on the upper side at the lobe apices, soon becoming mottled white-grey to blackened in older parts, but here and there with sparse, white, cobweb-like hyphae. Apothecia typically numerous, scattered or rather clumped, to 4(–5) mm wide, initially subpedicellate and slightly conical, later becoming flat; thalline margin 0.1–0.5 mm thick, not inflated, mostly smooth and entire, sometimes crenulate, more rarely with occasional radial cracks or pseudocyphellae-like small holes. Hymenium 110–140 µm thick; epithecium inspersed; asci 2-spored. Ascospores (36–)40–*48.3*–58(–60) × 22–*30.2*–36 µm. Conidia 6–10(–11) × 0.5 µm.

Chemistry: atranorin, stictic acid, cryptostictic acid (± trace), constictic acid (±), menegazziaic acid (± trace), peristictic acid (± trace), 3-*O*-methylconsalazinic acid (± trace), norstictic acid (trace) plus up to three unknown pigments (sometimes in trace concentrations) reacting UV+ orange on developed TLC plates; medulla K+ yellow, KC–, C–, P+ orange, UV–.

Endemic to Tasmania and seemingly restricted to subalpine and alpine areas of the central highlands where it is found almost exclusively on *Athrotaxis cupressoides*. Curiously it has not been collected from *A. selaginoides*. This species is morphologically very similar to *M. platytrema* and its allies, from which it can be distinguished unequivocally only by chromatographic methods, namely the three unidentified pigments that appear on developed TLC plates as strongly UV+ orange spots. However, its distinctive ecology offers a valuable hint to its identity, as do the frequently slightly upturned margins of the perforations.

Mt Field NP, Lake Dobson, 42°41′S 146°35′E, 1963, *P.W. James* (BM, HO); Long Tarns, 41°47′E 146°21′E, 1270 m, 2010, *G. Kantvilas 35/10* (HO); Lake Skinner, 42°56′S 146°41′E, 970 m, 2010, *G. Kantvilas 266/10* (HO, TROM).

4 Menegazzia caesiopruinosa P.James

In G. Kantvilas & P.W. James, *Lichenologist* 19: 25 (1987). Type: Tasmania, Brown Mountain Road, near Campania, 42°35′S 147°29′E, 220 m, on *Acacia mearnsii* in dry sclerophyll woodland, 22 March 1981, *G. Kantvilas 207/81* (holo—HO!; iso—BM!).

Thallus tightly adnate, forming irregular rosettes to 2–5 cm wide, sorediate. Lobes (1–)1.5–3 mm wide, ± cylindrical to somewhat flattened, much branched and imbricate at the centre of the thallus, at the margins palmately radiating; apices inflated, ± toe-like and discrete. Upper surface perforate, pale grey to pale greenish grey, matt but often glossy dark brown-grey along the margins and at the apices of young lobes, sometimes faintly maculate here and there and very finely white-pruinose, especially at the lobe apices and on laminal vesicles, smooth to faintly wrinkled in older parts. Perforations occasional, roundish, 0.2–1 mm wide, with the margins flush with the thallus surface or slightly turned inward. Medullary cavity byssoid, white, becoming discoloured grey to black with sparse, white, cobweb-like hyphae in older lobes. Soralia scattered or crowded, developing on the inner surface of roundish or convoluted, helmet-shaped, shortly-stalked vesicles 0.5–1.5(–2) mm wide that tear open and become abraded; soredia whitish to pale greenish grey, farinose to coarsely granular, occasionally spreading across the thallus. Apothecia not seen in Tasmanian specimens, reported as having 2-spored asci and ascospores 40–50 × 25–35 µm (James & Galloway 1992). Conidia not seen.

Chemistry: atranorin, stictic acid, constictic acid, cryptostictic acid (trace), menegazziaic acid (trace), peristictic acid (trace), norstictic acid (trace), 3-*O*-methylconsalazinic acid (trace), plus additional traces of related compounds; medulla K+ yellow, KC–, C–, P+ orange, UV–.

Locally common in dry, lowland areas, especially near the coast, where it occurs mostly on bark, wood or, occasionally, rocks in dry sclerophyll woodland, heathland and degraded pasture; also known from mainland Australia. It is easily recognised by the helmet-shaped vesicles that give rise to the soredia; such vesicles are also known from the alpine *M. globulifera*, which is smaller, yellow and contains usnic and lecanoric acids. Other Tasmanian species with soredia arising in vesicular pustules include *M. kantvilasii*, a species likewise containing stictic acid but with wider, irregularly interwoven lobes with constricted axils, and *M. abscondita* and *M. inactiva*, both of which have highly inflated, fragile lobes and contain fatty acids.

Moulting Lagoon, 42°01'S 148°13'E, 1970, *G.C. Bratt 70/334 & G. Degelius* (HO); Flinders Island, mouth of North-East River, 39°44'S 147°57'E, 2 m, 2007, *G. Kantvilas 97/07* (HO); Cape Frederick Hendrick, 42°52'S 147°58'E, 130 m, 2009, *G. Kantvilas 334/09* (HO).

5 Menegazzia caliginosa P.James & D.J.Galloway

In D.J. Galloway, *New Zealand J. Bot.* 21: 194 (1983).

Thallus tightly adnate, typically very brittle and fragile, forming irregular rosettes to 8 cm wide, or occasionally comprising small, scattered clumps of lobes intermixed with other species, sorediate. Lobes 1–3 mm wide, cylindrical to somewhat flattened, sparingly dichotomously branched but frequently with small, lateral lobules, radiating and contiguous at the centre of the thallus, discrete at the periphery; apices slightly inflated to flattened. Upper surface perforate, pale greenish grey with distinctly blackened margins, glossy, sometimes faintly maculate at the apices, epruinose, smooth to very faintly wrinkled in older parts. Perforations sparse, roundish, 0.2–1 mm wide, with the margins flush with the thallus surface or slightly turned inward. Medullary cavity byssoid, whitish or discoloured grey to black in older lobes, with a thin, ± continuous layer of pale orange, K+ purple pigment on the upper and lower surfaces. Soralia scattered, numerous, laminal, rounded and convex, to 1 mm wide, developing directly on the thallus surface and not associated with perforations; soredia whitish, typically farinose. Apothecia not seen in Tasmanian specimens, reported as having 8-spored asci and ascospores 28–35 × 15–18 µm (James & Galloway 1992). Conidia not found.

Chemistry: atranorin, stictic acid, echinocarpic acid, cryptostictic acid (± trace), constictic acid, menegazziaic acid (± trace), plus additional traces of related compounds and two orange-yellow pigments: 7-chloroemodin and flavo-obscurin B1; medulla K+ yellow, KC–, C–, P+ orange, UV–; pigmented areas K+ purple, UV+ orange.

Very rare in Tasmania and recorded fortuitously from fallen canopy branches in rainforest; also known from New Zealand and mainland Australia. This species is well characterised by its very distinctive chemistry, notably the presence of echinocarpic acid plus emodin pigments (best observed in younger parts of the thallus), and by its greenish, rather flattened lobes with distinct black margins and convex, white, laminal soralia.

Sumac Road, Spur 2, S of Arthur River, 41°08'S 145°02'E, 170 m, 1981, *G. Kantvilas 293/91* (BM, HO); Little Fisher River, 41°45'S 146°20'E, 820 m, 1984, *G. Kantvilas 702/84* (BM, HO); Green Head, 43°06'S 146°04'E, 750 m, 1991, *G. Kantvilas 76/91* (HO).

6 Menegazzia confusa P.James

In G. Kantvilas & P.W. James, *Lichenologist* 19: 26 (1987). Type: Tasmania, Lake Leake Road, 42°01'S 147°57'E, 380 m, on *Exocarpos cupressiformis* in dry sclerophyll forest, 24 October 1980, *G. Kantvilas* 467/80 (holo—HO!; iso—BM!).

Thallus loosely to tightly adnate, forming irregular rosettes to c. 12 cm wide, lacking soredia or isidia. Lobes 1.5–4 mm wide, ± cylindrical to somewhat flattened, occasionally a little inflated and 'puffy', sparsely dichotomously branched, imbricate and congested at the centre of the thallus, at the margins palmately radiating, discrete or contiguous; apices inflated or slightly flattened. Upper surface perforate, grey-white, cream-white to pale greenish grey, matt to glossy, often blackened along the lobe margins, epruinose, emaculate, smooth to slightly wrinkled in older lobes. Perforations sparse to numerous, roundish, 0.4–1.5(–

2.5) mm wide, with the margins flush with the thallus surface or slightly turned inward. Medullary cavity byssoid and white, especially in younger lobes, becoming mottled white-grey to blackened in older parts. Apothecia scattered, sometimes numerous and congested in the thallus centre, to 5(–10) mm wide, sessile to subpedicellate; thalline margin 0.2–0.5 mm thick, not inflated, smooth and entire, or crenulate and with occasional radial cracks or pseudocyphellae-like holes. Hymenium 100–140 µm thick; epithecium inspersed; asci 2-spored. Ascospores (26–)32–*42.5*–54(–58) × 18–*26.2*–32(–34) µm. Conidia 6–8 × 0.5–1 µm.

Chemistry: atranorin, caperatic acid (either compound sometimes only in trace amounts); medulla K–, C–, KC–, P–, UV–.

Widespread and common at low to middle elevations in dry sclerophyll woodlands in lower rainfall areas, where it occurs on subdominant trees and shrubs, on emergent shrubs in heathland, or in wet forests including rainforest, where it is confined chiefly to the canopy; also known from mainland Australia. It occurs exclusively on bark, forming tight rosettes encircling twigs and small branches, or spreading rosettes on trunks. This species is morphologically identical to *M. platytrema* and *M. norstictica*, both of which differ chemically and are readily separated from *M. confusa* by a means of a medullary P-test (they are both P+ orange).

Welcome Swamp, 40°57′S 144°48′E, 30 m, 1970, *G.C. Bratt 70/450* (HO); Mt Wellington, near Silver Falls, 42°55′S 147°15′E, 1981, *A.V. Ratkowsky L63* (HO); Bluff River Gorge, 42°31′S 147°40′E, 100 m, 2010, *G. Kantvilas 83/10* (HO).

7 Menegazzia corrugata P.James

In P.W. James & D.J. Galloway, *Fl. Australia* 54: 312 (1992). Type: Tasmania, Lake Skinner, 42°56′S 146°42′E, on *Eucryphia milliganii* in subalpine heathland, 960 m, 4 April 1980, *G. Kantvilas 81/80* (holo—HO!; iso—BM!).

Thallus typically loosely adnate, forming irregular rosettes to *c.* 8 cm wide or small pulvinate clumps encircling twigs, lacking soredia or isidia. Lobes (1.5–)2–6 mm wide, markedly inflated and cylindrical, slightly constricted here and there, rather sparsely dichotomously branched but also occasionally with small, toe-like, lateral lobes, loosely imbricate and congested at the centre of the thallus, at the periphery usually palmately radiating; apices discrete or contiguous. Upper surface perforate, grey-white or cream-white, matt or glossy, commonly streaked or speckled with black, especially along the lobe margins, epruinose, emaculate, markedly wrinkled except in the youngest lobes. Perforations scattered, occasional, round, 0.5–1.5 mm wide, cylindrical or cone-like and elevated significantly above the thallus surface. Medullary cavity byssoid, white in younger lobes, becoming black in older parts. Apothecia scattered, to 5(–7) mm wide, shortly pedicellate; thalline margin 0.5–1.5 mm thick, grossly inflated, crenate and wrinkled, almost enclosing and obscuring the disc when young. Hymenium 100–150 µm thick; epithecium not inspersed; asci 2-spored. Ascospores (37–)40–*53.7*–66 × (20–)22–*33.0*–40 µm. Conidia 7–8.5 × 0.5 µm.

Chemistry: atranorin (± trace), stictic acid, cryptostictic acid, constictic acid, menegazziaic acid (trace), norstictic acid (trace), 3-*O*-methylconsalazinic acid (trace), plus additional traces of related compounds; medulla K+ yellow, KC–, C–, P+ orange, UV–; unlike other stictic-acid containing species, the concentration of cryptostictic acid is unusually high, and peristictic acid is absent.

Endemic to Tasmania and locally common on twigs and small branches, typically at alpine to subalpine elevations. In implicate rainforest, it can extend into the lowlands. This is one of the most distinctive members of the genus in Tasmania, easily recognised by the grossly inflated, wrinkled lobes and apothecial margins. The most similar species, and one with which it is frequently associated is *M. elongata*, but that taxon has smooth, unwrinkled lobes, a non-inflated apothecial margin and contains the pigment isopigmentosin (UV+ yellow on developed TLC plates). In earlier Tasmanian literature and in herbarium collections, *M. corrugata* was referred to as *M. bullata* (Stirt.) Bitter, a synonym of *M. stirtonii* (Zahlbr.) Kantvilas & Louwhoff, a New Zealand endemic species characterised by norstictic acid and 8-spored asci.

Lake Hartz, 1963, *P.W. James* (BM, HO); Lake Judd forest, 42°59′S 146°25′E, 640 m, 1973, *G.C. Bratt 73/903* (HO); *c.* 1 km S of East Portal, 43°14′S 146°26′E, 780 m, 1991, *G. Kantvilas 112/91* (HO)).

8 Menegazzia elongata P.James

In P.W. James & D.J. Galloway, *Fl. Australia* 54: 312 (1992). Type: Tasmania, western shore of Lake Dobson, Mt Field National Park, 1040 m, 6 March 1981, *L. Tibell 11139* (holo—BM!; iso—UPS).

Thallus loosely adnate, very brittle and fragile, forming irregular rosettes to *c.* 8 cm wide or, more commonly, occurring as irregular clumps of loosely imbricate or scattered, disorganised lobes, lacking soredia or isidia. Lobes 1.5–3(–4) mm wide, markedly inflated, sausage-like, conspicuously constricted in elongated segments and at the axils, rather sparsely dichotomously branched as well as with short, lateral lobes that arise ± perpendicularly to the main lobes, loosely imbricate and radiating from the centre of the thallus; apices typically discrete. Upper surface perforate, grey-white or pale greenish grey, glossy, commonly streaked with black, especially along the lobe margins, epruinose, emaculate, smooth throughout. Perforations scattered, occasional, round, 0.5–1 mm wide, with the margins flush with the thallus surface or somewhat elevated, sometimes with a black rim. Medullary cavity byssoid, faintly yellowish at the lobe apices, generally white in younger lobes, becoming black in older parts. Apothecia scattered or clustered centrally, to 3.5(–5) mm wide, shortly pedicellate, rather obconical when young; thalline margin 0.2–0.5 mm thick, not inflated, smooth and entire, or a little crenulate when old. Hymenium 110–150 µm thick; epithecium not inspersed; asci 2-spored. Ascospores (38–)40–*52.2*–64(–66) × 26–*33.2*–40 µm. Conidia 5–6 × 0.5–1 µm.

Chemistry: atranorin (trace), stictic acid, cryptostictic acid (trace), peristictic acid (trace), constictic acid, plus the pigments isopigmentosin A and isopigmentosin B, which appear as UV+ yellow spots on developed TLC plates; medulla K+ yellow, KC–, C–, P+ orange, UV+ faint orange-pink at the lobe apices; this species does not contain menegazziaic acid.

Endemic to Tasmania and relatively uncommon, mainly at alpine to subalpine elevations, where it occurs in heathland, woodland and rainforest. It grows mostly on twigs and small-diameter branches and trunks. This species is best recognised by its fragile, highly inflated, constricted, sausage-like lobes and unusual chemistry, which includes isopigmentosin and lacks menegazziaic acid. The same chemistry is found in *M. subbullata* and *M. endocrocea*. The yellow pigments are usually concentrated in the tips of the youngest lobes, giving the otherwise whitish byssoid medulla a faintly orange-yellowish hue that fluoresces orange-pink in UV light; older parts of the thallus often lack pigment entirely.

Lake Sydney, 43°17′S 146°36′E, 720 m, 1982, *G. Kantvilas 293/82A* (HO); MacGregor Peak, 42°59′S 147°57′E, 570 m, 1989, *G. Kantvila 5/89* (HO); Lonely Tarns, shores of Judds Charm, 42°58′S 146°27′E, 910 m, 2000, *G. Kantvilas 477/00* (HO).

9 Menegazzia endocrocea Kantvilas

In H.T. Lumbsch *et al., Phytotaxa* 18: 85 (2011). Type: Tasmania, Mt Cameron, 40°59′S 147°56′E, on granite outcrops in heathland, 550 m, 5 July 1995, *G. Kantvilas 42/95 & P. Crittenden* (holo—HO!; iso—BM!).

Thallus rather loosely adnate, forming neat to irregular rosettes to 10 cm wide, or occurring as scattered, smaller clumps of lobes, lacking soredia and isidia. Lobes (1–)1.5–3(–4) mm wide, inflated, cylindrical, ± dichotomously branched, only slightly constricted at the axils, densely imbricate but generally lacking secondary lobules at the centre of the thallus, at the margins palmately radiating, contiguous; apices somewhat decumbent. Upper surface perforate, pale grey to cream-grey, pale brownish grey at the lobe apices, smooth, matt, emaculate, often patchily discoloured blackish in older or abraded portions, lightly whitish-pruinose, especially in younger parts. Perforations numerous, scattered, roundish to broadly ellipsoid, 0.5–1.7 mm wide, with the margins usually flush with the surface or, occasionally, raised and the perforations appearing volcano-like. Medullary cavity black and often with a sparse cobweb of whitish hyphae in older lobes, faintly pale orange in younger lobes and towards the lobe apices. Apothecia scattered, 1–4 mm wide, roundish, subpedicellate; thalline margin initially thick and inrolled, later to *c.* 0.1–0.3 mm wide, mostly smooth and entire, or with occasional radial cracks and crenulations. Hymenium 90–140 µm thick; epithecium not inspersed; asci 2-spored. Ascospores (38–)40–*51.5*–66(–72) × (24–)28–*34.8*–44(–56) µm. Conidia 6–8 × 1–1.2 µm.

Chemistry: atranorin (trace), stictic acid, cryptostictic acid (trace), peristictic acid (trace), constictic acid, plus the pigments isopigmentosin A with traces of isopigmentosin B and isopigmentosin C, appearing as UV+ yellow spots on developed TLC plates; medulla K+ yellow, KC–, C–, P+ orange, UV+ faint orange-pink at the lobe apices; menegazziaic acid is absent in this species.

Endemic to Tasmania and restricted to the relatively dry east coast and the islands of Bass Strait, where it occurs on granite in sheltered, fire-protected crevices on rocky, heathy summits overlooking the sea. It is rarely abundant and most thalli are small and very fragmented, suggesting a relict distribution and a species in decline.

Mt Amos, 42°09′S 148°18′E, 480 m, 1991, *G. Kantvilas 289/91* (HO); Mt Freycinet, 42°13′S 148°18′E, 600 m, 1995, *G. Kantvilas 151/95* (HO); Flinders Island, Mt Leventhorpe summit, 40°04′S 148°06′E, 500 m, 2007, *G. Kantvilas 48/07* (HO).

10 Menegazzia eperforata P.James & D.J.Galloway

In D.J. Galloway, *New Zealand J. Bot.* 21: 194 (1983).

Thallus tightly adnate, very brittle and fragile, typically forming rather neat rosettes to *c.* 8 cm wide, isidiate. Lobes 0.5–1(–1.5) mm wide, rather flattened and undulate, densely imbricate and congested with numerous small lobes and lobules at the centre of the thallus, at the margins dichotomously branched and palmately radiating; apices discrete, concave, often ± ascending. Upper surface eperforate, pale olive-green to greyish green, brownish or blackish brown along the margins and apices, glossy, epruinose, with whitish, effigurate maculae, especially in younger parts. Medullary cavity byssoid, persistently white on the upper surface, black with a few white, cobweb-like hyphae on the lower surface. Isidia laminal and marginal, rarely apical, typically very numerous and scattered but often crowded in the centre of the thallus, perpendicular to the thallus or decumbent, at first rather knob-like but soon becoming elongate, cylindrical, sometimes swollen to resemble small lobes, to 1.5 mm long and 0.13–0.25 mm wide, simple or branched, in the latter case with axils constricted. Apothecia and pycnidia not known.

Chemistry: atranorin, stictic acid, constictic acid, menegazziaic acid (trace), cryptostictic acid (± trace), peristictic acid (± trace), 3-*O*-methylconsalazinic acid (trace), plus additional traces of related compounds; medulla K+ yellow, KC–, C–, P+ orange, UV–.

Highly localised in Tasmania, mainly in lowland callidendrous rainforest and mature, eucalypt-dominated mixed forest in the north-west and north-east; also known from Flinders Island, New Zealand, the eastern Australian mainland and Lord Howe Island. Its preferred habitat is the rough, rather dry, flaky bark of mature, straight *Nothofagus cunninghamii* trunks in moderately sunny forest gaps. *Menegazzia eperforata* is a most distinctive species on account of its eperforate lobes and isidia, two uncommon features in the genus as a whole.

Corinna, Pieman River, 41°39′S 145°05′E, 80 m, *G. Kantvilas 2/82* (BM, HO); Newdegate Creek, 41°41′S 145°03′E, 110 m, 1982, *G. Kantvilas 290/82* (HO); Weldborough Pass, 41°13′S 147°57′E, 500 m, 1985, *G. Kantvilas 137/85* (BM, HO).

11 Menegazzia globulifera R.Sant.

Ark. Bot. 30A(11): 30 (1942).

Thallus tightly adnate, typically very brittle and fragile, forming irregular rosettes or pulvinate clumps to *c.* 5 cm wide, or occasionally comprising scattered clumps of lobes, sorediate. Lobes 1–1.5(–2.5) mm wide, cylindrical or more typically somewhat flattened, rather irregularly branched at broad angles with often-constricted axils, frequently also with small, lateral, toe-like lobules, loosely imbricate to congested at the centre of the thallus, but usually ± discrete at the periphery; apices somewhat flattened to concave. Upper surface perforate, pale yellow or greenish yellow, glossy, markedly glossy black at the margins and brown to brown-black at the lobe apices, usually faintly maculate here and there, epruinose, smooth. Perforations sparse, roundish, 0.2–0.4 mm wide, with the margins flush with the thallus surface or slightly elevated. Medullary cavity byssoid, white, becoming discoloured grey to black with a thin cobweb of white hyphae in

older lobes. Soralia scattered, laminal, arising at the edges of elevated perforations or, more typically, developing from elevated, globose, helmet-shaped vesicles 0.5–2(–3) mm wide that rupture and become sorediate on the inner surface; soredia whitish, farinose to coarsely granular. Apothecia not known. Conidia 5.5–6.5 × 0.5 µm.

Chemistry: usnic and lecanoric acids; medulla K–, KC+ red, C+ red, P–, UV–.

This is one of the most distinctive and unmistakeable members of the genus on account of its yellow colour and helmet-shaped, vesicular soralia. It is widespread and common in western and central areas at subalpine and alpine elevations, forming small thalli on twigs and young branches in alpine scrub and low rainforest. It has not been recorded from the north-eastern highlands, but is also known from southern South America and New Zealand.

Waterfall Valley Hut, 41°43′S 145°57′E, 900 m, 1966, *G.C. Bratt & J.A. Cashin 3701* (HO); Lake Dobson, 42°41′S 146°35′E, 1030 m, 1981, *G. Kantvilas 620/81 & P. James* (BM, HO); Algonkian Mountain, 42°24′S 146°03′E, 950 m, 1990, *G. Kantvilas 62/90* (HO).

12 Menegazzia hypernota Bjerke

Syst. Biodivers. 2: 45 (2004).

Thallus loosely adnate, fragile, forming irregular, twig-clasping colonies of rather disorganised lobes, sorediate. Lobes 1–3 mm wide, inflated and cylindrical, with numerous, short, toe-like laterals and inflated, discrete apices. Upper surface perforate, grey-white, emaculate, smooth, streaked with black along the margins, brownish to black at the lobe apices. Perforations scattered, sparse to occasional, roundish, 0.1–0.8 mm wide, with the margins flush with the thallus surface or elevated and cylindrical to conical. Medullary cavity byssoid, white in the younger lobes, becoming black in older parts. Soralia laminal or arising at the margins of the perforations, less commonly apical, ± roundish, 0.5–1 mm wide; soredia coarsely granular. Apothecia unknown in Tasmanian material; asci reported as 2-spored with the ascospores 26–32 × 14–18 µm (Bjerke 2004). Pycnidia not seen.

Chemistry: atranorin and fumarprotocetraric acid; medulla K–, KC–, C–, P+ red, UV–.

Recorded from the twigs of *Nothofagus cunninghamii* in a low, scrubby, alpine rainforest copse; also present in New Zealand. Medullary fumarprotocetraric acid is an uncommon chemosyndrome in the Australian region and found only in the fertile, non-sorediate taxa, *M. petraea* (endemic to Tasmania) and *M. conica* (endemic to New South Wales). The Tasmanian specimen contains additional traces of two UV+ orange pigments, detectable by TLC.

Crest Range, 43°17'28"S 146°30'26"E, 980 m, 2016, *G. Kantvilas 228/16* (HO).

13 Menegazzia hypogymnioides Kantvilas

Lichenologist 44: 214 (2012). Type: Tasmania, Clear Hill, 42°41′S 146°16′E, 1190 m, on conglomerate boulders in alpine heathland, 13 April 1996, *G. Kantvilas 28/96* (holo—HO!).

Thallus loosely adnate, very brittle and fragile, forming small, irregular rosettes to *c.* 2–5 cm wide that sometimes coalesce into more extensive patches, lacking soredia or isidia. Lobes 0.4–1(–1.5) mm wide, linear-elongate, cylindrical to somewhat flattened, ± dichotomously branched with the axils often constricted, and with frequent small, toe-like, lateral lobules, loosely imbricate and jumbled together at the centre of the thallus, usually discrete and diverging at the margins; apices flattened and concave. Upper surface essentially eperforate, mottled olive-brown to black-brown, rarely a little greyish, also with extensive black streaks and blotches, glossy, emaculate, epruinose, smooth. Perforations absent or extremely rare and mostly resembling irregular tears in the upper surface. Medullary cavity byssoid, white, soon becoming discoloured grey to black with a thin cobweb of white hyphae in older lobes. Apothecia and pycnidia not known.

Chemistry: atranorin (minor), stictic acid, cryptostictic acid, constictic acid, menegazziaic acid (trace), norstictic acid (trace), peristictic acid (trace), 3-*O*-methylconsalazinic acid (trace); medulla K+ yellow, KC–, C–, P+ orange, UV–.

Endemic to Tasmania, very rare, easily overlooked and known only from a few south-western peaks where it occurs on alpine boulders, usually in sheltered microhabitats. With its elongate, eperforate, rather spidery lobes, *M. hypogymnioides* is more reminiscent of a *Hypogymnia* species than a *Menegazzia*. However, it is more likely to be confused with *M. aeneofusca*, which occurs in similar habitats but is clearly perforate, albeit sometimes very sparsely, and forms adnate, circular thalli, or with *M. eperforata* on account of the lack of perforations. However, *M. eperforata* is never alpine, never saxicolous and also has abundant isidia.

Mt Scorpio, 1000 m, 1984, *G. Kantvilas 713/84* (HO); Mt Sprent, 42°48′S 145°58′E, 1059 m, 1984, *G. Kantvilas 567/84* (HO).

14 Menegazzia inactiva P.James & Kantvilas

In G. Kantvilas & P.W. James, *Lichenologist* 19: 25 (1987). Type: Tasmania, Sumac Road, Spur 2, south of Arthur River, 41°08′S 145°02′E, 170 m, on *Tasmannia lanceolata* in rainforest, 24 November 1980, *G. Kantvilas 674/80* (holo—HO!; iso—BM!).

Thallus loosely adnate, extremely brittle and fragile, forming irregular colonies to *c.* 10 cm wide along twigs or small branches, sorediate. Lobes 1–3 mm wide, markedly inflated and ± cylindrical, with widely diverging, irregularly branched main lobes and shorter laterals arising almost perpendicularly, loosely imbricate ± throughout; apices discrete, inflated. Upper surface perforate, pale grey to pale greenish grey, only rarely blotched or lined with black along the lobe margins, matt, epruinose, usually faintly maculate towards the lobe apices, mostly smooth. Perforations sparse, roundish, 0.5–1 mm wide, markedly elevated above the thallus surface in cylindrical or cone-like projections, usually with a small collar and the margins turned inwards when young. Medullary cavity byssoid and white for the most part, becoming discoloured grey to brownish black in older lobes. Soralia numerous, ragged and torn, developing on the inner surface of the apices of the lobes, at the margins of the perforations or on lobule-like, laminal vesicles 1–3 mm wide; soredia whitish to pale greenish grey, farinose to coarsely granular. Apothecia and pycnidia not known.

Chemistry: atranorin and four unknown fatty acids; medulla K–, C–, KC–, P–, UV–.

This species was locally abundant at the type locality where it grew on the twigs of undershrubs and low branches of trees in sunny gaps in rainforest. The site was logged in the 1980s, and *M. inactiva* has not been recorded in the area since. However, it has been found at several other wet forest localities, but alway represented by only small, fragmentary thalli. This species is characterised by the combination of an extremely fragile, inflated, grey thallus, an unusual chemistry and the striking mode of soredial development. It is closely related to *M. abscondita*, from which it can be distinguished unequivocally solely by chemical means. In both species, the soredia develop in any of several ways: typically they arise in laminal, cylindrical or inflated vesicles that become torn open; alternatively they arise at the apices of the lobes, which bulge and tear, not unlike the vesicles; thirdly, the soralia may be associated with the cylindrical, elevated perforations. All three methods essentially lead to the same distinctive appearance of tubular thalline structures (lobes, vesicles or perforations) with torn apices and peeled back, ragged margins dissolving into soredia. Reports of *Menegazzia inactiva* from New Zealand remain unconfirmed.

Keith River Road on banks of Dip River, 41°06′S 145°27′E, 250 m, 1992, *G. Kantvilas 87/92, B. Fuhrer & J. Jarman* (HO); Junction Creek, 43°06′S 146°17′E, 200 m, 2006, *G. Kantvilas 436/06* (HO); MacGregor Peak, 42°59′S 147°57′E, 550 m, 2010, *G. Kantvilas 15/10* (HO).

15 Menegazzia jamesii Louwhoff & Kantvilas

In G. Kantvilas & S. Louwhoff, *Lichenologist* 36: 104 (2004).

Thallus tightly adnate, forming irregular rosettes to 10–20(–30) cm wide, lacking soredia or isidia. Lobes 1–4 mm wide, cylindrical to rather angular in cross-section, at the centre of the thallus densely imbricate,

contorted and rather twisted or ridged, with numerous interwoven secondary lobes and lobules, at the margins palmately radiating, ± dichotomous, discrete or contiguous; apices inflated. Upper surface perforate, dull pale greenish grey with a bluish hue when fresh and moist, greyish white to cream when dry, matt to glossy, epruinose, emaculate, smooth to weakly wrinkled. Perforations numerous, round to irregularly oval, 0.5–1.5(–3) mm wide, with the margins flush with the thallus surface or turned inward, sometimes markedly so. Medullary cavity on the upper surface byssoid and white, usually sparsely and irregularly streaked or speckled with patches of a coarse, bright yellow to yellow-orange, K+ purple pigment, especially at the lobe apices and beneath the apothecia, on the lower side becoming mottled white-grey to blackened in older parts with sparse, white cobweb-like hyphae. Apothecia scattered or clustered, usually numerous, to 2–7(–9) mm wide, sessile to subpedicellate; thalline margin 0.1–0.2 mm thick, not inflated, mostly smooth and entire, or with occasional radial cracks, becoming a little scabrid when old. Hymenium 110–140 µm thick; epithecium not inspersed; asci 8-spored but usually with 2 or more spores aborted during development. Ascospores 24–*29.9*–35 × 16–*19.7*–24 µm. Conidia 6–8 × 0.8 µm.

Chemistry: atranorin, lichesterinic acid (±) and protolichesterinic acid, sometimes together with additional fatty acids, plus the yellow pigments, pigmentosin A and skyrin; medulla K–, KC–, C–, P–, UV–; pigmented areas K+ purple.

Rare in Tasmania and known from just two collections from relict rainforest in the north; common in Victoria. This species is easily confused with the common and widespread *M. pertransita*, which differs mainly by lacking the K+ purple pigment (often replaced by the suffused pale yellowish secalonic acid that reacts K–).

Summit ridge of Mt Scott, 41°18'S 147°31'E, 965 m, 2002, *G. Kantvilas 229/02* (HO); Blue Tier FR, Poimena Car Park, 41°11'58"S 148°00'17"E, 2450 ft [735 m], 2011, *J.C. Lendemer 30065* (HO, NY).

16 Menegazzia kantvilasii P.James

In P.W. James & D.J. Galloway, *Fl. Australia* 54: 313 (1992). Type: Mt Roland Track from Claude Road, 41°27'S 146°17'E, on *Pittosporum bicolor* in rainforest, 600 m, 2 April 1985, *G. Kantvilas 140/85* (holo—HO!; iso—BM!).

Thallus loosely to tightly adnate, forming irregular rosettes to *c.* 10 cm wide, sorediate. Lobes 1.5–3 mm wide, mainly ± cylindrical, a little puckered and ridged, main lobes ± dichotomously branched, with numerous short laterals diverging at wide angles and the axils ± constricted, contiguous, loosely interwoven or tightly congested centrally, ± discrete at the periphery; apices inflated or dimpled and flattened. Upper surface perforate, pale grey to pale greenish grey ± throughout, discoloured brown-black only at the lobe apices and axils, glossy, epruinose, emaculate, smooth to weakly wrinkled and dimpled. Perforations numerous, roundish, 0.2–1 mm wide, at first slightly elevated above the thallus surface with the margins turned inwards, later becoming cylindrical, with the margins reflexed, lacerate and sorediate. Medullary cavity byssoid and white, especially near the lobe apices, becoming mottled white-grey to blackened with a sparse cobweb of white hyphae in older parts. Soralia scattered, abundant, developing mainly from vesicular pustules *c.* 0.7–1.2 mm wide that tear, peel back and become sorediate on the inner surface of the margins, also developing at the margins of the perforations and then rather crescent-shaped and hooded; soredia whitish to pale greenish grey, coarsely granular. Apothecia and pycnidia unknown.

Chemistry: atranorin, stictic acid, cryptostictic acid (trace), constictic acid, menegazziaic acid (trace), norstictic acid (trace), 3-*O*-methylconsalazinic acid (trace); medulla K+ yellow, KC–, C–, P+ orange, UV–.

Endemic to Tasmania and known only from the type collection. It grew on the smooth bark of *Pittosporum bicolor* in a steep, narrow gully supporting a relict patch of cool temperate rainforest. This species is allied to *M. neozelandica*, which displays a similar gross morphology of inflated, widely diverging, interwoven lobes (as distict from the palmately radiating forms seen, for example, in *M. subpertusa* and *M. caesiopruinosa*). However, *M. neozelandica* differs in having soralia that do not develop in pustules but arise solely from the margins of the perforations.

17 Menegazzia minuta P.James & Kantvilas

In G. Kantvilas & P.W. James, *Lichenologist* 19: 24 (1987). Type: Tasmania, Sumac Road, Spur 2, south of Arthur River, 41°08′S 145°02′E, 170 m, occasional on *Eucryphia lucida* in rainforest, 19 May 1981, *G. Kantvilas* 331/81 (holo—HO!; iso—BM!).

Thallus very tightly adnate, extremely brittle and fragile, forming irregular rosettes or clumps of disorganised lobes to c. 1.5 cm across, isidiate. Lobes 0.3–0.6(–1) mm wide, flattened and barely hollow in cross-section, irregularly branched with the axils somewhat constricted, imbricate and congested with numerous small lobes and lobules overlapping each other at the centre of the thallus, at the periphery divergent and rather spidery; apices discrete, flat and adnate. Upper surface eperforate, olive-brown, glossy, especially at the lobe apices, epruinose, emaculate. Medullary cavity byssoid, persistently white on the upper surface, black with a few white, cobweb-like hyphae on the lower surface. Isidia laminal and marginal, scattered, typically becoming crowded in the centre of the thallus, decumbent, at first rather knob-like but soon becoming flattened and resembling minute lobules. Apothecia and pycnidia not known.

Chemistry: atranorin, protolichesterinic acid and lichesterinic acid; medulla K–, C–, KC–, P–, UV–.

Endemic to Tasmania and one of Tasmania's rarest lichens, listed as "Endangered" under the *Tasmanian Threatened Species Protection Act 1995*. It grows in rainforest on the canopy limbs of *Eucryphia lucida*. This is an extremely inconspicuous species, characterised by the glossy olive-brown thallus of minute, spidery lobes, densely beset with lobule-like isidia. Superficially, it resembles a tiny species of *Austromelanelixia*. It is perhaps related to *M. eperforata*, which is likewise isidiate and eperforate, although that species is much larger, highly conspicuous, green to olive-green and contains stictic acid.

Murchison Hwy, S of Tullah, 41°47′S 145°36′E, 300 m, 1983, *G. Kantvilas 2/83* (HO, TROM).

18 Menegazzia myriotrema (Müll.Arg.) R.Sant.

Ark. Bot. 30A(11): 13 (1942); —*Parmelia myriotrema* Müll.Arg., *Bull. Herb. Boissier* 4: 91 (1896). Type: Tasmania, Mt Wellington, *F.R.M. Wilson 1731* (holo—G).

Menegazzia retipora (Stirt.) Bitter, *Hedwigia* 40: 172 (1901); —*Parmelia retipora* Stirt., *Trans. Proc. New Zealand Inst.* 32 **:** 80 (1900); type: Tasmania, May 1892, *Mrs Heywood McEwen 36* (holo—BM!).

Menegazzia prototypica P.James, *in* P.W. James & D.J. Galloway, *Fl. Australia* 54: 314 (1992); type: Tasmania, Projection Bluff, 41°43′S 146°42′E, on *Nothofagus cunninghamii* in rainforest, 17 March 1982, *G. Kantvilas s.n.* (holo—HO!).

?*Parmelia pertusa* var. *coskinodes* F.Wilson, *Pap. & Proc. Roy. Soc. Tasmania* 1892: 175 (1893); type: Tasmania, Mount Arthur, Tasman Peninsula, *W.A. Weymouth* (*n.v.*).

Thallus typically tightly adnate, forming rosettes to c. 5 cm wide or elongate colonies enveloping twigs for up to 10 cm, sometimes rather eroded and moribund in the centre, lacking soredia or isidia. Lobes 0.5–1(–1.5) mm wide, rather flattened, densely branched, imbricate and sometimes congested with tiny secondary lobes at the centre of the thallus, at the margins palmately radiating; apices discrete, usually concave, sometimes slightly ascending. Upper surface perforate, pale grey to greenish grey, occasionally somewhat olive-grey or greyish brown at the lobe apices and blackish along the lobe margins, glossy, epruinose, mostly smooth, rarely with whitish, effigurate maculae at the lobe apices. Perforations typically very numerous and forming a lace-like network, roundish or slightly elongate, sometimes ± slit-like near the lobe apices, 0.1–0.5(–0.7) mm wide, but very variable in size and large and small perforations adjacent, margins flush with the thallus surface or turned inward. Medullary cavity byssoid and white on the upper side, black with a few cobweb-like, white hyphae on the lower side. Apothecia scattered or clustered in the centre of the thallus, to 2(–4.5) mm wide, sessile to subpedicellate, mostly flat and discoid when mature; thalline margin 0.1–0.2 mm thick, not inflated, smooth and entire, or crenulate and with occasional radial cracks. Hymenium 100–150 µm thick; epithecium inspersed; asci 2-spored. Ascospores 34–*43.6*–54 × (20–)22–*29.1*–36 µm. Conidia filiform, 6–7 × 0.5 µm.

Chemistry: atranorin, stictic acid, lecanoric acid, cryptostictic acid (± trace), constictic acid, menegazziaic acid (± trace), norstictic acid (trace), peristictic acid (± trace), 3-*O*-methylconsalazinic acid (trace), plus additional traces of related compounds; medulla K+ yellow, KC–, C–, P+ orange, UV–; although lecanoric acid is consistently present, its concentration is not sufficient to yield a C+ red reaction.

Widespread in wet forest and scrub, especially in rainforest, where it occurs on twigs and small branchlets in the forest canopy; also known from cool temperate rainforest in Victoria. With its tiny lobes and typically abundant perforations that form a delicate lace-like pattern, this is one of the most distinctive and beautiful members of the genus. Although its chemical composition is the stictic acid chemosyndrome, also found in many other Australasian species, it consistently contains lecanoric acid as well, a compound with only a sporadic occurrence in the genus.

Mt Dundas, 41°54′S 145°28′E, 1893, *L. Rodway 38* (HO); Fools Tarn Track, 42°53′S 147°09′E, 1000 m, 1965, *G.C. Bratt & J.A. Cashin 2594* (HO); Sumac Road, S of Horton River, 41°15′S 145°01′E, 230 m, 1984, *G. Kantvilas 605/84* (*A. Vězda: Lich. Sel. Exsiccati 2018*) (HO).

19 Menegazzia neozelandica (Zahlbr.) P.James

In P.W. James & D.J. Galloway, *Fl. Australia* 54: 313 (1992); —*Parmelia neozelandica* Zahlbr., *Cat. Lich. Univ.* 6: 53 (1929).

Menegazzia circumsorediata R.Sant., *Ark. Bot.* 30A(11): 14 (1924).

Thallus loosely adnate, forming irregular rosettes to *c.* 15 cm wide, sorediate. Lobes 1–3 mm wide, rather inflated, mainly ± cylindrical or sometimes rather folded, dimpled and ridged, irregularly to dichotomously branched, with branches diverging at wide angles and the axils ± rounded, contiguous to loosely imbricate, sometimes tightly interwoven centrally but ± discrete at the periphery; apices inflated or slightly flattened and dimpled. Upper surface perforate, pale grey to pale greenish grey ± throughout, only rarely discoloured grey-brown at the lobe apices or along their margins, glossy, epruinose, sometimes with scattered, blotch-like, whitish maculae, especially at the lobe apices, smooth, occasionally with longitudinal or transverse cracks in the cortex. Perforations sparse, roundish, 0.3–1 mm wide, elevated above the thallus surface in short-cylindrical or cone-like bulges, with the margins turned inwards when young but soon becoming reflexed and sorediate. Medullary cavity byssoid and white throughout. Soralia scattered, occasional, developing at the margins of the perforations and elevated above the thallus surface, mostly crescent-shaped and only partially extending around the circumference of the perforation, occasionally annular, rarely also laminal; soredia whitish to pale greenish grey, farinose to coarsely granular. Apothecia rare, to 3 mm wide, ± conical and shortly pedicellate; thalline margin 0.2–0.5 mm thick, crenulate, becoming sorediate. Hymenium 110–150 µm thick; epithecium not inspersed; asci 2-spored. Ascospores (36–)40–*49.7*–66 × 20–*29.9*–38 µm. Conidia not found.

Chemistry: atranorin, stictic acid, cryptostictic acid (trace), constictic acid, menegazziaic acid (trace), norstictic acid (trace), 3-*O*-methylconsalazinic acid (trace), plus traces of additional related compounds; medulla K+ yellow, KC–, C–, P+ orange, UV–.

Uncommon in Tasmania; also known from New Zealand and southern South America. This species commonly grows on the trunks of *Pomaderris apetala* in lowland wet forests and is locally abundant in the forests of the south-east. The form and arrangement of the lobes are diagnostic: rather ridged and folded, broadly diverging with rounded axils, irregularly overlapping in the centre of the thallus like strands of a coarse mat. The development of the soralia at the margins of elevated perforations is likewise diagnostic. In these ways, this species is readily distinguished from *M. subpertusa*, which has narrower lobes that mostly radiate palmately from the centre of the thallus, perforations that are flush with the thallus surface, and laminal soralia. Fertile material of *M. neozelandica* is seldom encountered in Tasmania, but the pedicellate apothecia with a relatively thick, sorediate margin are distinctive. The most similar species to *M. neozelandica* is *M. kantvilasii*, which has essentially the same general morphology, but soralia that are derived from laminal pustules.

Creekton Road, 43°24′S 146°53′E, 90 m, 1966, *G.C. Bratt & J.A. Cashin 3367* (HO); Denium Hill, Robbins Island Track, 40°45′S 144°53′E, 5 m, 1993, *G. Kantvilas 144/93 & J.A. Elix* (HO); Lichen Hill, 43°04′S 147°56′E, 570 m, 2010, *G. Kantvilas 119/10* (HO).

20 Menegazzia norstictica P.James

In P.W. James & D.J. Galloway, *Fl. Australia* 54: 313 (1992).

Thallus loosely to tightly adnate, generally forming rather neat rosettes to *c.* 8 cm wide, lacking soredia or isidia. Lobes 1–3.5 mm wide, ± cylindrical, sparsely dichotomously branched, sometimes also with short, toe-like laterals, imbricate and congested at the centre of the thallus, at the margins palmately radiating, discrete or contiguous; apices inflated or slightly flattened. Upper surface perforate, grey-white, cream-white to pale greenish grey, sometimes blackened along the lobe margins and at the apices, matt to glossy, epruinose, mostly emaculate but sometimes with faint, effigurate maculae near the lobe apices, smooth when young but increasingly wrinkled, dimpled or somewhat ridged in older lobes. Perforations sparse to numerous, roundish, 0.3–1.5 mm wide, with the margins flush with the thallus surface or slightly turned inward. Medullary cavity mostly black, with occasional, white, cobweb-like hyphae. Apothecia scattered, to 5 mm wide, sessile to subpedicellate; thalline margin 0.2–0.4 mm thick, not inflated, smooth and entire, or crenulate and with occasional radial cracks. Hymenium 130–160 µm thick; epithecium inspersed; asci 2-spored, sometimes with one spore aborted. Ascospores 40–*50.3*–60 × (20–)22–*28.6*–36 µm. Conidia 5–6.5 × 0.5–0.8 µm.

Chemistry: atranorin, norstictic acid and connorstictic acid; medulla K+ yellow→red, KC–, C–, P+ orange, UV–.

Widely scattered but generally uncommon in wet sclerophyll forest and rainforest, where it is an epiphyte on smooth bark, typically on understorey trees in well-lit habitats; also recorded from the southern Australian mainland. Together with *Menegazzia platytrema* and *M. confusa*, *M. norstictica* forms an aggregate of species characterised by a rosette-forming thallus with palmately radiating, esorediate lobes and 2-spored asci. It is distinguished from these species solely by its medullary chemistry.

Track to Lady Barron Falls, 42°42′S 146°42′E, 250 m, 1973, *G.C. Bratt 73/518* (HO); c. 3 km S of Teepookana, 42°13′S 145°26′E, 220 m, 1990, *G. Kantvilas* 613/90 (HO); W of Tomalah Creek, 43°05′S 146°39′E, 245 m, 2000, *G. Kantvilas 168/00* (HO, S).

21 Menegazzia nothofagi (Zahlbr.) P.James & D.J.Galloway

In D.J. Galloway, *New Zealand J. Bot.* 21: 194 (1983); —*Parmelia nothofagi* Zahlbr., *Denkschr. Akad. Wiss. Wien, Math.-Naturwiss. Kl.* 104: 360 (1941).

Thallus tightly to loosely adnate, very brittle and fragile, typically forming rather neat rosettes to *c.* 10 cm wide, sometimes in more extensive colonies of several coalescing thalli, or occasionally consisting of rather dispersed lobes amongst bryophytes, mostly ± sorediate. Lobes 0.5–1(–1.5) mm wide, rather flattened and undulate, densely imbricate and congested with numerous small lobes and lobules at the centre of the thallus, at the margins dichotomously branched and palmately radiating; apices discrete, concave or, more rarely, swollen and bulbous, often ± ascending. Upper surface perforate, pale olive-green to greyish green, brownish or blackish brown along the margins and apices, glossy, epruinose, usually with abundant, whitish, effigurate maculae, especially in younger parts. Perforations scattered, usually abundant, roundish or elongate, sometimes ± slit-like, 0.1–0.5 mm wide but variable in size and large and small perforations adjacent, with margins flush with the thallus surface or turned inward. Medullary cavity byssoid, persistently white on the upper surface, black with a few white, cobweb-like hyphae on the lower surface. Soralia laminal and ± marginal, typically congested in the centre of the thallus, developing from inflated, subglobose, elongate or coralloid-branched isidia-like vesicles 0.1–0.5(–1) mm wide, sometimes in elevated, convoluted clusters to 2.5 mm wide, which rupture or become abraded; soredia sparse, coarse, whitish or concolorous with the thallus. Apothecia and pycnidia not known.

Chemistry: atranorin, stictic acid, cryptostictic acid (trace), constictic acid, menegazziaic acid (± trace), peristictic acid (± trace), 3-*O*-methylconsalazinic acid (trace), plus additional traces of related compounds; medulla K+ yellow, KC–, C–, P+ orange, UV–.

Widespread and common in Tasmania and also known from New Zealand and the south-eastern Australian mainland. It is occasional in rainforest in the canopy or on relatively dry trunks in sunny forest gaps. It is also found in relict wet forest and scrub in fire-protected gullies, shaded hillsides or cloud-shrouded low summits. However, most commonly it is encountered in eucalypt woodland where it grows on shaded, moist rock faces in fire-protected situations. The small, olive-tinged, maculate lobes with soralia developing from abraded, swollen vesicles are very distinctive. The vesicles can be simple, bulbous outgrowths that rupture, peel back and abrade, or they can become elaborately convoluted, with coralloid branches and extensions that resemble isidia.

Catagunya, 42°27′S 146°36′E, 175 m, 1975, *G.C. Bratt & K.M. MacKay 75/400* (HO); South Sister, near the summit, 41°32′S 148°10′E, 800 m, 2004, *G. Kantvilas 316/04* (HO); Flinders Island, Mt Strzelecki, 40°12′S 148°05′E, 710 m, 2006, *G. Kantvilas 43/06* (HO).

22 Menegazzia pertransita (Stirt.) R.Sant.

Ark. Bot. 30A(11): 12 (1942); —*Parmelia pertransita* Stirt., *Proc. Phil. Soc. Glasgow* 10: 294 (1877).

Menegazzia weindorferi (Zahlbr.) R.Sant., *Ark. Bot.* 30A(11): 12 (1942); —*Parmelia weindorferi* Zahlbr., *Ann. Mycol.* 4: 489 (1906); type: Tasmania, ad corticem arborum frondosarum in monte Roland, *G. Weindorfer* (*A. Zahlbruckner: Lichenes Rariores Exsiccati n. 95*) (syn—BM!).

Thallus generally tightly adnate, forming regular rosettes to 10–20 cm wide, sometimes coalescing to form very extensive, widespreading patches, lacking soredia or isidia. Lobes 1–3(–3.5) mm wide, ± cylindrical, at the centre of the thallus very densely imbricate and contorted, with numerous interwoven secondary lobes, lobules and toe-like laterals, at the margins usually palmately radiating, ± dichotomous, discrete or contiguous; apices usually inflated. Upper surface perforate, dull pale greenish grey with a bluish hue when fresh and moist, greyish white to cream when dry, frequently streaked with black along the lobe margins and thallus centre, or speckled black with abundant pycnidia, matt to glossy, epruinose, emaculate, smooth to weakly wrinkled. Perforations numerous, round to irregularly oval, 0.5–1.5(–2) mm wide, with the margins typically turned inward, sometimes markedly so. Medullary cavity on the upper surface byssoid and white, at the lobe apices often with a suffused, pale yellowish, K– pigment, on the lower side becoming mottled white-grey to blackened in older parts with sparse, white cobweb-like hyphae. Apothecia scattered or clustered centrally, usually numerous, to 2–4(–4.5) mm wide, typically subpedicellate, conical when young, later ± persistently cupulate, rarely discoid; thalline margin 0.1–0.3 mm thick, usually rather tough, brittle and cartilaginous, not inflated, mostly smooth and entire, or with occasional radial cracks, becoming scabrid and sometimes brownish when old. Hymenium 110–150 µm thick; epithecium not inspersed; asci 8-spored. Ascospores (24–)28–*31.9*–38 × 14–*19.9*–22(–26) µm. Conidia 6–8 × 0.5 µm.

Chemistry: atranorin, lichesterinic acid and protolichesterinic acid, often with additional pale yellow pigments (eumitrins or secalonic acid derivatives); medulla K–, KC–, C–, P–, UV–; pigmented areas K– or ± weak reddish brown.

Widespread, common and often the dominant and most conspicuous epiphyte on young branches and trunks in rainforest. Whereas in tall, closed forests it is restricted to the canopy, in more open forests, especially at higher elevation, it can extend along the entire length of the trunks and major branches. It is similarly widespread and common in New Zealand and Victoria. This species is very readily recognised by the broad, esorediate, palmately spreading thallus, the 8-spored asci and the presence of fatty acids in the medulla. The most closely related species, the rare *M. jamesii*, differs chiefly by the presence of the bright orange-yellow, K+ purple pigment, skyrin, in the medullary cavity of the lobe apices. The medulla of *Menegazzia pertransita* is also often pigmented yellowish, but the pigment is usually secalonic acid, which is pale, suffused and reacts K–. In practice, *M. pertransita* is more likely to be confused with some of the other, relatively broad-lobed, esorediate taxa, such as *M. platytrema* and its allies. These species are readily distin-

guished by their 2-spored asci, inspersed hymenium and their chemical composition (stictic, norstictic or caperatic acids). However, with experience, the identification of *M. pertransita* is possible in the field and does not require chemical tests or apothecial sections. Its morphology is very distinctive, especially the congested, intertwining lobes with numerous toe-like laterals, the very high degree of black speckling from the abundant pycnidia, the definite bluish hue of the upper surface and the cupulate apothecia with a markedly scabrid, tough and brittle margin. Furthermore, *M. platytrema* lacks yellowish pigmentation in the medulla, nor does it form extensive expanses where contiguous thalli fuse together to clothe entire canopy branches and young trunks.

Mt Victoria, 41°20′S 147°50′E, 770 m, 1970, *G.C. Bratt & K.M. MacKay 70/1336* (HO); Quamby Bluff, 41°39′S 146°42′E, 850 m, 1980, *G. Kantvilas 144/80* (BM, HO); Mt Louisa, 43°27'41"S 146°24'22"E, 870 m, 2016, *L.H. Cave 3310* (HO).

23 Menegazzia petraea Kantvilas

Lichenologist 44: 230 (2012). Type: Tasmania, summit of Gog Range, 41°31′S 146°26′E, 720 m, on conglomerate boulders in scrubby heathland, 27 October 1996, *G. Kantvilas 61/96* (holo—HO!).

Thallus tightly adnate, forming rather irregular, incomplete rosettes to *c.* 5 cm wide, lacking soredia or isidia. Lobes 0.5–1.5 mm wide, cylindrical to slightly flattened, densely branched, imbricate and congested with tiny secondary lobes at the centre of the thallus, at the margins irregularly radiating; apices usually contiguous, inflated or flattened and concave. Upper surface perforate, pale to dark grey-brown or blackish brown, olive towards the apices, mostly glossy, epruinose, emaculate, smooth to slightly wrinkled. Perforations numerous, roundish, 0.1–0.5 mm wide, with the margins flush with the thallus surface or slightly turned inward. Medullary cavity byssoid and white, becoming discoloured grey to black in older lobes. Apothecia scattered, to 3 mm wide, subpedicellate, cupulate to discoid when mature; thalline margin 0.05–0.2 mm thick, not inflated, smooth and entire, or with occasional radial cracks. Hymenium 100–140 µm thick; epithecium inspersed; asci 2-spored; paraphyses with apices mostly unpigmented, 3–4 µm thick. Ascospores 30–*39.4*–48(–60) × 20–*26.5*–34 µm. Conidia 5–7 × 0.5 µm.

Chemistry: atranorin, fumarprotocetraric acid, protocetraric acid (trace), succinprotocetraric acid (trace); medulla K–, KC–, C–, P+ red, UV–.

Endemic to Tasmania, and known only from boulders of Ordovician conglomerate in alpine heathland; it is locally abundant on Clear Hill. It is morphologically ± identical to *M. aeneofusca*, with which it often grows, and, apart from being generally more glossy, can be distinguished with certainty solely by the presence of fumarprotocetraric (rather than stictic) acid.

Ragged Range, 42°45′S 146°18′E, 420 m, 1972, *G.C. Bratt & J.A. Cashin 72/938* (HO); The Thumbs, 42°39′S 146°18′E, 1080 m, *G.C. Bratt & K.M. MacKay 73/48* (HO); Clear Hill, 42°41′S 146°16′E, 1195 m, 2021, *G. Kantvilas 61/21* (HO).

24 Menegazzia platytrema (Müll.Arg.) R.Sant.

Ark. Bot 30A(11): 13 (1942); —*Parmelia platytrema* Müll.Arg., *Flora* 70: 60 (1887).

Menegazzia fertilis P.James, *in* P.W. James & D.J. Galloway, *Fl. Australia* 54: 312 (1992).

Thallus loosely to tightly adnate, enveloping twigs or, more commonly, forming rather neat rosettes to *c.* 10 cm wide, lacking soredia or isidia. Lobes 1–3.5(–4) mm wide, cylindrical to somewhat flattened, sparsely dichotomously branched, imbricate, congested and convoluted at the centre of the thallus, at the margins palmately radiating, discrete or contiguous; apices inflated or slightly flattened. Upper surface perforate, grey-white, cream-white to pale greenish grey, sometimes suffused brownish in exposed situations, often blackened along the lobe margins and at the apices, matt to glossy, epruinose and emaculate except at the very tips where sometimes very lightly pruinose and with faint, effigurate maculae, smooth when young but increasingly wrinkled, dimpled or somewhat ridged in older lobes. Perforations sparse to numerous, roundish, 0.3–1.5(–2) mm wide, with the margins flush with the thallus surface or slightly turned inward. Medullary cavity byssoid and white, especially in younger lobes, becoming mottled white-grey to blackened in older parts. Apothecia scattered, sometimes numerous and congested in the thallus centre, to 4(–6) mm

wide, initially subpedicellate and rather conical, later becoming flat and sessile; thalline margin 0.2–0.5 mm thick, not inflated, smooth and entire, or crenulate and with occasional radial cracks, not infrequently with pseudocyphellae-like small holes. Hymenium 110–150 µm thick; epithecium inspersed; asci 2-spored. Ascospores 40–*49.3*–60(–64) × 24–*28.1*–38 µm. Conidia 6–7 × 0.5 µm.

Chemistry: atranorin, stictic acid, cryptostictic acid (± trace), constictic acid (±), menegazziaic acid (± trace), peristictic acid (± trace), 3-*O*-methylconsalazinic acid (± trace), norstictic acid (trace) plus additional traces of related compounds; medulla K+ yellow, KC–, C–, P+ orange, UV–.

Widespread in Tasmania and also known from mainland Australia. It ranges from lowland to alpine elevations, occurring mostly on bark or wood in open, dry sclerophyll forests, wet forests, heathland and scrub. In closed forests, it is restricted mainly to the canopy but, in more open vegetation, it is found on trunks, branches and twigs in exposed, sunny situations. This is a highly variable species. Some specimens, particularly those enveloping twigs may have very narrow, congested lobes, whereas rosette-forming thalli, such as occur on logs or larger trunks and branches, tend to have broader, more loosely radiating lobes. Similarly, in wetter or shaded locations and/or at high elevations, the species has broader, more inflated, loosely aggregated lobes, whereas in low rainfall or very exposed sites, the lobes tend to be more narrow, appressed and highly congested. Together with *M. confusa* (caperatic acid), *M. norstictica* (norstictic acid), *M. athrotaxidis* (stictic acid plus UV+ pigments) and *M. ramulicola* (lecanoric acid), *Menegazzia platytrema* forms an aggregate of species characterised by an esorediate thallus of pale grey, radiating lobes, 2-spored asci and an inspersed hymenium. These species can be distinguished with certainty only by their chemical composition, although ecological and morphological clues can aid their identification.

Lake Pedder, 42°57′S 146°10′E, 1965, *G.C. Bratt & J.A. Cashin 2749* (BM, HO); Tarraleah, 42°18′S 146°26′E, 600 m, 1980, *G. Kantvilas 343/80* (BM, HO); Skullbone Plains, c. 2 km S of Kenneth Lagoon, 42°04′S 146°19′E, 990 m, 2012, *G. Kantvilas 239/12* (HO).

25 Menegazzia ramulicola Kantvilas

Lichenologist 44: 234 (2012). Type: Tasmania, Lake Dobson, Mt Field National Park, 42°41′S 146°35′E, 1030 m, on *Orites revoluta* in subalpine woodland, 13 August 1981, *G. Kantvilas 616/81* & *P. James* (holo—HO!; iso—BM!).

Thallus tightly adnate, typically enveloping twigs in extended colonies to *c.* 8 cm long, lacking soredia or isidia. Lobes 1–2.5 mm wide, cylindrical to rather flattened, densely imbricate and congested at the centre of the thallus, at the margins contiguous to discrete and free; apices inflated or slightly flattened. Upper surface perforate, pale grey-white to cream-white, sometimes a little suffused brownish in exposed situations, often blackened along the lobe margins and at the apices, and blotched or speckled with abundant black pycnidia, matt to glossy, epruinose, emaculate, smooth when young but increasingly wrinkled in older lobes. Perforations very sparse, scattered, roundish, 0.3–1 mm wide, with the margins flush with the thallus surface or slightly turned inward. Medullary cavity byssoid and white, especially in younger lobes, becoming mottled white-grey to blackened, with sparse, white, cobweb-like hyphae in older parts. Apothecia typically numerous and congested in the thallus centre, to 2–3(–4) mm wide, initially subpedicellate and rather conical, later becoming flat and sessile; thalline margin 0.1–0.2 mm thick, not inflated, smooth and entire, or crenulate, very rarely with occasional radial cracks or pseudocyphellae-like holes. Hymenium 110–150 µm thick; epithecium inspersed; asci 2-spored. Ascospores (30–)34–*40.8*–50 × (18–)20–*25.0*–34 µm. Conidia 6–8 × 0.5–0.8 µm.

Chemistry: atranorin (trace), stictic acid, lecanoric acid, cryptostictic acid (± trace), constictic acid (±), menegazziaic acid (± trace), peristictic acid (± trace), 3-*O*-methylconsalazinic acid (trace), plus additional traces of related compounds; medulla K+ yellow, KC–, C–, P+ orange, UV–; although lecanoric acid is consistently present, it is not in sufficient concentrations to yield a C+ red reaction.

Endemic to Tasmania; found on twigs and young branches, usually on shrubs at highland elevations, or at the margins of wet forest where it colonises the twigs of young saplings. *Menegazzia ramulicola* is a small species with a very compact growth form, tightly enveloping twigs. So few are the perforations that in some

cases, it initially recalls a species of *Hypogymnia*, especially with its centrally clustered apothecia and the marginal lobes that may be quite separate and free of the substratum. Identifying *M. ramulicola* is not easy, and whilst a combination of ecological and morphological data offers some clues, an unequivocal determination requires chemical analysis.

Lake Osborne Track, 43°13′S 146°45′E, 820 m, 1981, *G. Kantvilas 536/81 & P. James* (BM, HO); Savage River Pipeline, 41°17′S 145°18′E, 480 m, 1990, *G. Kantvilas 245/90* (HO); Gordon River Road near Boyd Lookout, 42°49′S 146°22′E, 580 m, 2010, *G. Kantvilas 161/10* (HO, TROM).

26 Menegazzia sanguinascens (Räsänen) R.Sant.

Ark. Bot. 30A(11): 28 (1942); —*Parmelia sanguinascens* Räsänen, *Ann. Bot. Soc. Zool.-Bot. Fenn. 'Vanamo'* 2, 1: 18 (1932).

Thallus tightly adnate, sorediate. Lobes 1–3 mm wide, ± cylindrical, sparsely dichotomously branched, also with short, toe-like laterals; apices discrete, inflated or slightly flattened. Upper surface perforate, pale grey to pale greenish grey, glossy, emaculate, epruinose, smooth to faintly wrinkled in older parts. Perforations sparse, roundish, 0.5–1.5 mm wide, with the margins flush with the thallus surface or slightly turned inward. Medullary cavity byssoid and white at the lobe apices, soon becoming discoloured grey to black with sparse, cobweb-like white hyphae in older lobes. Soralia laminal, not associated with the perforations, rounded and convex to ± capitate, 1–1.5 mm wide, not forming a cavity into the medulla; soredia whitish to pale greenish grey, sometimes slightly discoloured brownish, granular to farinose. Apothecia not seen in Tasmanian specimens, reported as having 2-spored asci and ascospores 40–55 × 22–35 µm (Bjerke & Elvebaak 2001). Pycnidia not found.

Chemistry: atranorin, norstictic acid and connorstictic acid; medulla K+ yellow→red, KC–, C–, P+ orange, UV–.

Very rare in Tasmania and known only from canopy twigs in the rainforests of the north-west; also known from southern South America. The combination of soralia and norstictic acid are diagnostic.

Sumac Road, Spur 2, S of Arthur River, 41°08′S 145°02′E, 170 m, 1981, *G. Kantvilas 681/81* (HO); Savage River Pipeline Road near Rapid River, 41°16′S 145°20′E, 440 m, 2015, *G. Kantvilas 2201/15* (HO).

27 Menegazzia subbullata P. James & Kantvilas

In G. Kantvilas & P.W. James, *Lichenologist* 19: 25 (1987). Type: Tasmania, Lake Dobson, Mt Field National Park, 42°41′S 146°35′E, 1030 m, on *Microstrobos nipophilus* in coniferous heath, 13 August 1981, *G. Kantvilas 645/81* & *P. James* (holo—BM!; iso—HO!).

Thallus loosely adnate, brittle and fragile, typically occurring as irregular clumps of loosely imbricate or scattered, disorganised lobes enveloping twigs, more rarely forming rosettes to *c.* 8 cm wide, sorediate. Lobes 1.5–3(–4) mm wide, markedly inflated, sausage-like, constricted in elongated segments and at the axils, rather sparsely dichotomously branched as well as with short, lateral lobes that arise ± perpendicularly to the main lobes, loosely imbricate and radiating from the centre of the thallus; apices inflated, typically discrete, sometimes free of the substratum. Upper surface perforate, grey-white or pale greenish grey, usually glossy, commonly streaked with black, especially along the lobe margins, brownish at the lobe apices, epruinose, mostly emaculate but sometimes with effigurate white maculae at the apices, smooth ± throughout. Perforations scattered, occasional, round, 0.5–1(–1.5) mm wide, with the margins flush with the thallus surface or, more commonly, rather cylindrical and elevated but with the margins nevertheless turned inwards, sometimes with a black rim. Medullary cavity byssoid, generally white in younger lobes, becoming black in older parts, rarely pale yellowish at the very apices. Soralia laminal or arising at the inner surface of the margins of the perforations, initially globose, to 1.5(–2) mm wide, sometimes spreading across the thallus surface; soredia coarsely granular, white or discoloured grey-black. Apothecia uncommon, clustered centrally, to 3 mm wide, shortly pedicellate, conical; thalline margin 0.2–0.5 mm thick, inflated, crenulate. Hymenium 100–120 µm thick; epithecium not inspersed; asci 2-spored. Ascospores 30–*39.4*–50(–55) × 20–*27.7*–36(–40) µm. Conidia not found.

Chemistry: atranorin (trace), stictic acid, cryptostictic acid (trace), peristictic acid (trace), constictic acid, plus the pigments isopigmentosin A and isopigmentosin B, which appear as UV+ yellow spots on developed TLC plates; medulla K+ yellow, KC–, C–, P+ orange, UV–; this species does not contain menegazziaic acid.

Endemic to Tasmania; widespread at alpine elevations where it is a common epiphyte of twigs and small branches of shrubs and low trees in heathland and woodland. It is characterised by the inflated, sausage-like, sorediate lobes and a distinctive chemistry that includes the pigment isopigmentosin. It is chemically identical to two esorediate Tasmanian species, *M. endocrocea* and *M. elongata*.

Mt Barrow, 41°23′S 147°25′E, 1200 m, 1983, *G. Kantvilas 80/83* (HO); Mt Norold, 43°15′S 146°15′E, 950 m, 1994, *G. Kantvilas 16/94* (HO); Mt Bobs, 43°18′S 146°36′E, 1080 m, 1998, *G. Kantvilas 56/98* (HO).

28 Menegazzia subpertusa P.James & D.J.Galloway

In D.J. Galloway, *New Zealand J. Bot.* 21: 195 (1983).

Thallus tightly adnate, usually forming rather neat, circular rosettes to 8 cm wide, sorediate. Lobes 1–2.5 mm wide, ± cylindrical, sparsely dichotomously branched, typically imbricate and/or contiguous at the centre of the thallus but occasionally quite separate and divergent, sometimes with abundant, short, toe-like laterals, palmately radiating; apices discrete, sometimes rather inflated. Upper surface perforate, pale grey to pale greenish grey, sometimes discoloured dark greyish in exposed situations, mainly matt but glossy dark brown-grey along the lobe margins and apices, frequently faintly maculate and very finely white-pruinose, especially towards the lobe apices, smooth to faintly wrinkled in older parts. Perforations occasional, roundish, 0.3–1(–1.2) mm wide, with the margins flush with the thallus surface or slightly turned inward. Medullary cavity byssoid and white at the lobe apices, soon becoming discoloured grey to black with sparse, cobweb-like white hyphae in older lobes. Soralia very variable, sparse and scattered, or very abundant and crowded, laminal, not associated with the perforations or only very rarely so, occasionally subapical on short lateral lobes, initially rounded and markedly convex, (0.5–)1–2 mm wide, becoming more diffuse or coalescing with age and abrasion, in time forming a cavity into the medulla; soredia whitish to pale greenish grey, granular to farinose. Apothecia occasional to abundant, to 4.5(–6) mm wide; thalline margin 0.2–0.5 mm thick, not inflated, smooth and entire, or crenulate and with radial cracks and/or pseudocyphellae-like small holes, sometimes becoming abraded or sorediate. Hymenium 110–130 µm thick; epithecium inspersed; asci 2-spored. Ascospores (30–)34–*43.1*–51 × 18–*25.2*–30(–32) µm. Conidia 6–7 × 0.8–1 µm.

Chemistry: atranorin, stictic acid, cryptostictic acid (± trace), constictic acid (±), menegazziaic acid (± trace), peristictic acid (± trace), 3-*O*-methylconsalazinic acid (± trace), norstictic acid (trace), plus additional traces of related compounds; medulla K+ yellow, KC–, C–, P+ orange, UV–.

One of the most common species of the genus in Tasmania, especially in lower rainfall areas, found mostly at low elevations in open areas, on rocks, the bark of trees and shrubs, and on wood; similarly widespread in southern mainland Australia, New Zealand and southern South America. It is characterised by the combination of palmately radiating lobes, laminal soredia that are mostly neither associated with perforations nor derived from pustules, 2-spored asci and the stictic acid chemosyndrome. Soredial development in *M. subpertusa* is variable. The most common form is where the soralia are strongly convex, roundish and scattered along the lobes, the soredia are relatively coarse, and no hole into the medullary cavity is developed. Less commonly, but very distinctively, the soredia may develop at the apices of short, occasionally somewhat upturned lobes. Such soralia may appear ± stalked and eventually develop a hole through to the medulla. There are also some relatively broad-lobed specimens where the soredia spread irregularly along the lobes and onto the margins of the apothecia.

Woods Quoin, 42°17′S 147°05′E, 1000 m, *G.C. Bratt & J.A. Cashin 72/385* (HO); Platform Peak, 42°41′S 147°03′E, 650 m, 1984, *A. Moscal 7903* (HO); South Sister, near summit, 41°32′S 148°10′E, 800 m, 2004, *G. Kantvilas 305/04* (HO).

29 Menegazzia subtestacea Kantvilas

Lichenologist 44: 240 (2012). Type: Tasmania, Crater Peak, 41°39′S 145°56′E, 1200 m alt., on *Orites revoluta* in alpine heath, 16 February 1984, *G. Kantvilas 305/84 & P.W. James* (holo—HO!; iso—BM!).

?*Parmelia pertusa* var. *montana* F.Wilson, *Pap. & Proc. Roy. Soc. Tasmania* 1892: 175 (1893); type: Mount Wellington, on twigs of shrubs at summit (*n.v.*).

Thallus typically loosely adnate, encircling twigs for up to *c.* 10 cm long, more rarely forming rosettes to *c.* 15 cm wide on rocks, lacking soredia or isidia. Lobes (1–)1.5–3.5(–4.5) mm wide, cylindrical, a little inflated, sparsely dichotomously branched, loosely imbricate or tightly congested centrally; apices usually discrete and inflated. Upper surface perforate, usually dark chestnut-brown, in shaded situations sometimes mottled pale grey, pale yellowish brown or brown-grey, often blackened here and there, especially along the lobe margins and at the apices, matt to glossy, epruinose, emaculate, smooth when young but increasingly wrinkled or somewhat ridged in older lobes. Perforations sparse, roundish, 0.2–1 mm wide, with the margins usually flush with the thallus surface or occasionally slightly elevated. Medullary cavity byssoid and white, especially in younger lobes, soon becoming black in older parts. Apothecia scattered, to 5(–9) mm wide, pedicellate, initially cylindrical with the pedicel markedly swollen, later flaring and becoming conical or hemispherical, at length ± peltate; thalline margin 0.2–0.5 mm thick, not inflated, entire or crenulate and mostly persistently smooth and lacking radial cracks or pseudocyphellae-like holes, in older apothecia often rather angular and turned upwards. Hymenium 120–170 µm thick; epithecium inspersed; asci 2-spored. Ascospores (36–)40–*50.8*–64 × 24–*32.7*–40 µm. Conidia 6.5–8.5 × 0.5–0.8 µm.

Chemistry: atranorin, stictic acid, cryptostictic acid (± trace), constictic acid (±), menegazziaic acid (± trace), peristictic acid (± trace), 3-*O*-methylconsalazinic acid (± trace), norstictic acid (trace) plus additional traces of related compounds; medulla K+ yellow, KC–, C–, P+ orange, UV–.

Endemic to Tasmania and widespread, almost exclusively at alpine altitudes. Its typical habitat is on the twigs of alpine shrubs, although in the south-west, it is sometimes found on rocks in slightly sheltered aspects. This species is easily recognised by its chestnut-brown thallus and relatively broad, shortly pedicellate apothecia that are frequently turned up at the margins. For many years, this species was confused with the New Zealand endemic, *M. testacea* P.James & D.J.Galloway, which, although superficially similar, differs by containing additional hypostictic, hyposalazinic and hypoconstictic acids.

Hartz Road, 43°13′S 146°46′E, 1050 m, 1966, *G.C. Bratt & F.N. Lakin 3055* (HO); Mt Norold, 43°15′S 146°15′E, 1994, *J. Jarman s.n.* (HO); Lots Wife, 42°57′S 146°28′E, 1090 m, 2000, *G. Kantvilas 462/00* (HO).

30 Menegazzia tarkinea Kantvilas

Lichenologist 44: 242 (2012). Type: Tasmania, Savage River Pipeline Road, 41°17′S 145°18′E, 480 m, on young regrowth of *Nothofagus cunninghamii* at rainforest edge, 25 May 1990, *G. Kantvilas 245/90A* (holo—HO!).

Thallus tightly adnate, forming an extended colony to *c.* 6 cm long enveloping a twig, lacking soredia or isidia. Lobes 1–2.5 mm wide, cylindrical to rather flattened, densely imbricate and congested ± throughout; apices contiguous or separate, inflated or slightly flattened. Upper surface perforate, pale grey-white, suffused brownish or speckled black in patches, especially along the lobe margins and at the apices, matt, epruinose, emaculate, smooth but increasingly wrinkled in older lobes. Perforations very sparse, scattered, roundish, 0.2–0.5 mm wide, with the margins flush with the thallus surface or slightly turned inward. Medullary cavity byssoid and white in younger lobes, becoming mottled white-grey to blackened with sparse, white, cobweb-like hyphae in older parts. Apothecia scattered, to 6 mm wide, ± subpedicellate, soon markedly flat and discoid; thalline margin 0.1–0.4 mm thick, not inflated, smooth and entire, or crenulate and with occasional radial cracks. Hymenium 90–110 µm thick; epithecium inspersed; asci 2-spored. Ascospores 40–52 × 28–34 µm. Conidia not found.

Chemistry: atranorin, lecanoric acid, norstictic acid and connorstictic acid; medulla K+ yellow→red, KC–, C–, P+ orange, UV–; although lecanoric acid is consistently present, it is not in sufficient concentrations to yield a C+ red reaction.

Endemic to Tasmania and known only from the type specimen, collected from the twigs of young *Nothofagus cunninghamii* saplings regenerating along a roadside at the edge of tall callidendrous rainforest. It is morphologically very similar to *M. ramulicola,* sharing with that species a very compact growth form, tightly enveloping its twig substratum, very few perforations and a thin apothecial thalline margin, but is distinguished from that species, and indeed from all other known species of the genus, by its unique chemistry.

31 Menegazzia ultralucens P.James & D.J.Galloway

In D.J. Galloway, *New Zealand J. Bot.* 21: 195 (1983).

Thallus tightly adnate, forming rather irregular small rosettes to c. 8 cm wide, sorediate. Lobes (1–)1.5–3 mm wide, ± cylindrical, with main lobes sparingly dichotomously branched and small lateral lobules arising at right-angles, generally loosely imbricate ± throughout, sometimes discrete, with axils sometimes rather constricted; apices inflated or somewhat flattened, discrete. Upper surface perforate, pale grey to pale greenish grey, mostly matt but glossy dark brown-grey to black at the margins and lobe apices, emaculate, epruinose, smooth. Perforations sparse, roundish, 0.2–0.8 mm wide, when young with the margins flush with the thallus surface, later becoming somewhat elevated and the margins slightly turned upward. Medullary cavity byssoid and white at the lobe apices, elswhere discoloured grey to black with occasional cobweb-like white hyphae. Soralia scattered, mostly laminal or at the apices of lateral lobes, occasionally at the sides of perforations, initially convex, roundish, 0.4–1.5 mm wide, later becoming rather coarse and ragged as the thallus surface erodes and secondary, gaping, elevated, sorediate perforations develop; soredia whitish to pale greenish grey, farinose to coarsely granular, occasionally spreading across the thallus. Apothecia very rare, not seen in Tasmanian specimens, reported as having 2-spored asci and ascospores 45–53 × 28–31 µm (James & Galloway 1992). Conidia not found.

Chemistry: atranorin and alectoronic acid; medulla K–, KC+ red, C–, P–, UV+ white.

Very uncommon and restricted to rainforest where it colonises canopy twigs; also known from New Zealand. This species is readily distinguished by its unique chemical composition.

Ben Ridge Road, 41°21′S 147°39′E, 850 m, 1981, *G. Kantvilas 106/81* (BM, HO); Little Fisher River, 41°45′S 146°20′E, 820 m, 1982, *G. Kantvilas* 297/82 (HO); Tahune Bridge, 43°06′S 146°44′E, 50 m, 2007, *G. Kantvilas 16/07* (HO).

REFERENCES

Bjerke J (2004) A new sorediate, fumarprotocetraric acid-producing lichen species of *Menegazzia* (Parmeliaceae, Ascomycota). *Systematics and Biodiversity* **2** 45–47.

Bjerke JW Elvebakk A (2001) The sorediate species of the genus *Menegazzia* (Parmeliaceae, lichenized Ascomycotina) in southernmost South America. *Mycotaxon* **78** 363–392.

James PW Galloway DJ (1992) *Menegazzia*. *Flora of Australia* **54** 213–246.

Kantvilas G (2012) The genus *Menegazzia* (Lecanorales: Parmeliaceae) in Tasmania revisited. *Lichenologist* **44** 189–246.

Kantvilas G (2019) Further additions to the genus *Menegazzia* A. Massal. (Parmeliaceae) in Australia, with a revised regional key. *Lichenologist* **51** 137–146.

Kantvilas G Louwhoff S (2004) A new eight-spored species of *Menegazzia* from Australia. *Lichenologist* **36** 103–111.

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